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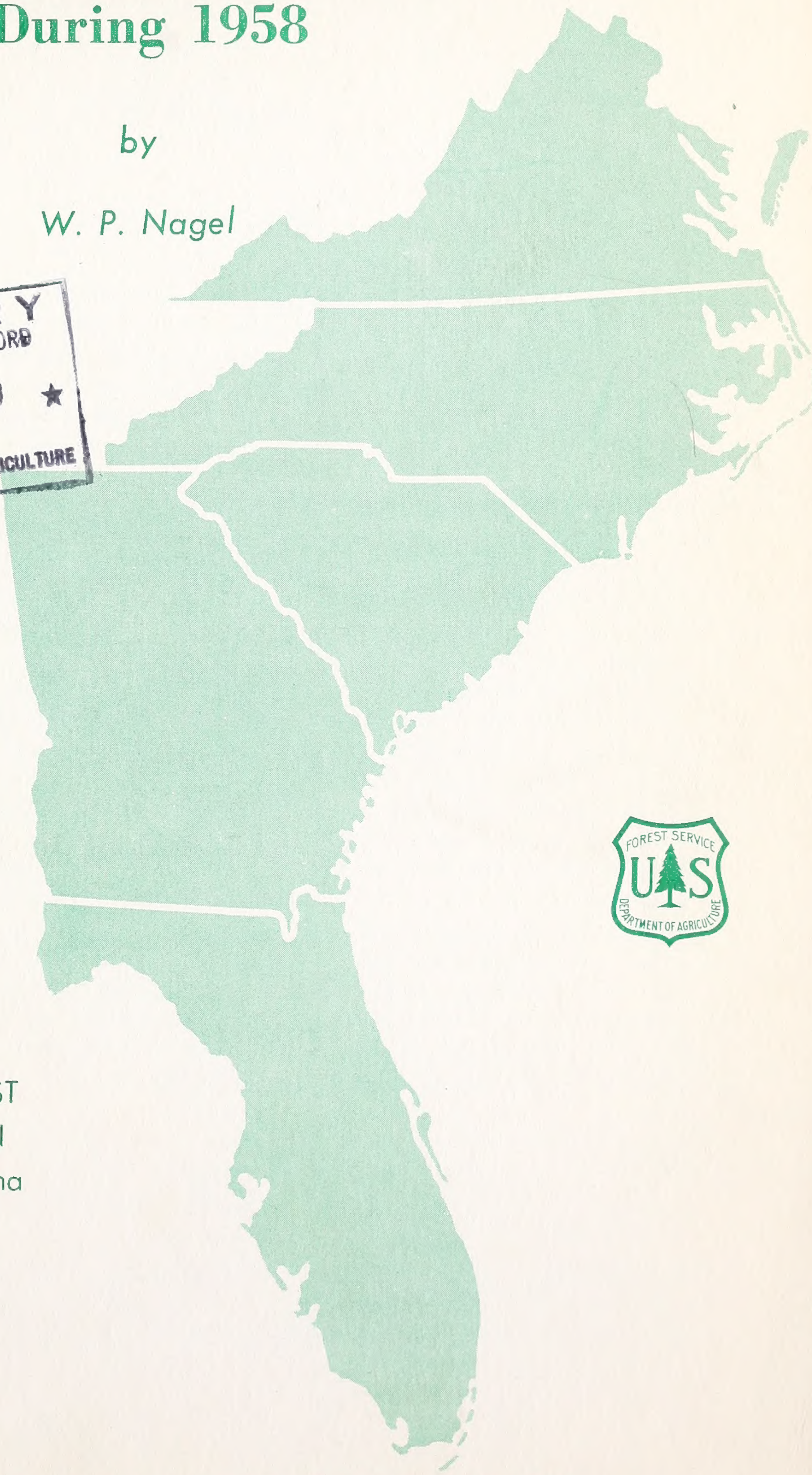
by

W. P. Nagel



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U. S. DEPARTMENT OF AGRICULTURE

SOUTHEASTERN FOREST
EXPERIMENT STATION
Asheville, North Carolina

Joseph F. Pechanec,
Director

U. S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE

FOREST INSECT CONDITIONS IN THE SOUTHEAST DURING 1958

by

W. P. Nagel

INTRODUCTION

Losses, in terms of killed trees, in the Southeast during 1958 were less than they had been in many years. This was mainly due to the absence of any sizeable bark beetle outbreak, quite a rarity, in any part of the Southeastern region. However, other forest insect outbreaks have caused considerable warranted concern. Figure 1 shows the locations of the various major insect outbreaks that took place during the year.

In brief, low temperatures in the southern Appalachian Mountains the winter of 1957-58 halted the southern pine beetle epidemic. Black turpentine beetle activity diminished by the middle of the year. Two pine sawfly epidemics, one in Virginia and North Carolina and the other in north-central Florida, occurred on about 400,000 and 300,000 acres, respectively. An expanding outbreak of the balsam woolly aphid, a notorious killer of true firs, was discovered on Mt. Mitchell, North Carolina, and adjacent lands. The hardwood defoliator, elm spanworm, in Georgia, Tennessee, and North Carolina spread over 570,000 acres of forest in the southern Appalachians.

The information contained in this report is not that solely obtained by Federal entomologists. Much of the data was furnished by the various state and private organizations in the Southeast. The detection and reporting programs in the area are gradually being increased and perfected as the impact of losses due to forest insects is being realized. In addition to improving these reporting systems, key personnel in the states work mainly on forest pest problems. During 1958, the State of South Carolina employed an entomologist to work mainly on a detection system, and Virginia added another technical man to its insect and disease section. The strengthening of these positions is an indication of the importance foresters attach to insects in the South.

SOUTHERN PINE BEETLE

The epidemic of the southern pine beetle that had existed in the southern Appalachian Mountains since 1952-53 came to an end in 1958. An outbreak of moderate size took place on some private lands in the tidewater section of eastern North Carolina.

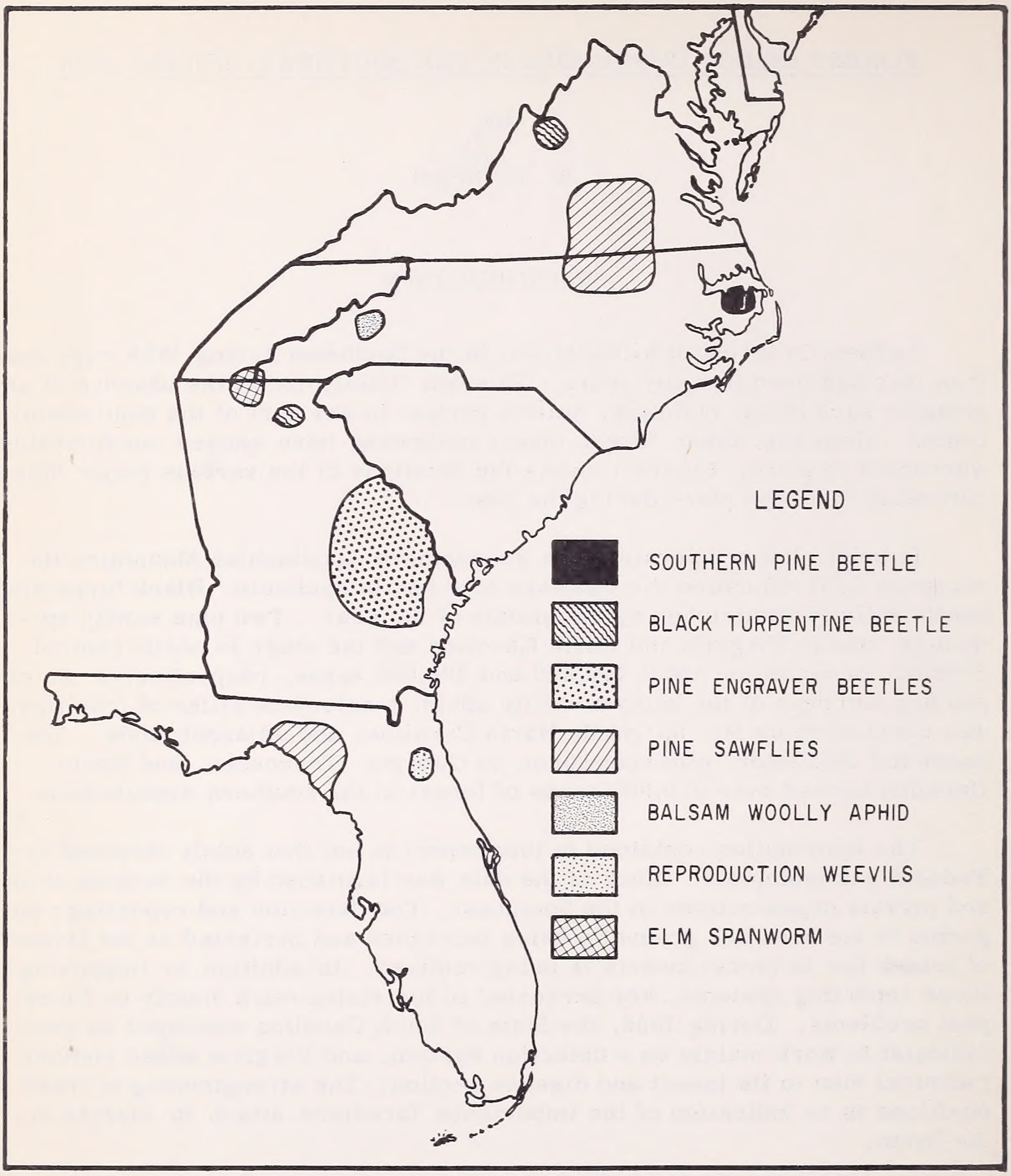

Figure 1.--Major forest insect outbreaks in the Southeast in 1958.

During the 1957-58 winter in the mountain areas of North Carolina, Tennessee, Georgia, and South Carolina the lowest temperatures in many years were recorded on several occasions. Appraisals to determine the effectiveness of these temperatures on the overwintering stages of the beetle were conducted in April. These examinations revealed that, exclusive of eggs, from 95 to 100 percent of the broods had been killed. This high mortality prompted the advice to the various control units that the spraying of infested trees be stopped.

Operational aerial surveys were conducted by the control units throughout the spring, summer, and fall until hardwood coloration prevented accurate mapping. On a few of these flights red-topped pines were observed, but subsequent ground checks showed that in most instances these trees had been killed by either Ips or black turpentine beetles. Because of these continued negative results, all control activities were halted by the end of the year.

Activity of the southern pine beetle on private lands in Tyrrell County, North Carolina, was reported during June. An aerial survey of the area revealed that 36 spots containing about 450 trees were located in a 145-square-mile area. Ground examinations showed that beetle populations in the infested trees were large and vigorous, and it was predicted that a possible 3 to 1 increase in the number of attacked trees could occur with the succeeding generation. Even though a population buildup was expected, the nature of the terrain was such that chemical control was not practical or practicable. This section of North Carolina is subject to frequent flooding, and the dense undergrowth would have made treating costs prohibitive in most locations. Salvage of the dying timber and removal of many of the overmature loblolly and pond pine was employed as a control measure.

In the second aerial survey of the area, in September, results showed that the rate of increased infestation had not been as great as anticipated. It was estimated that about 800 trees were infested, or slightly less than a twofold increase over that observed in June.

The third aerial survey and subsequent ground examinations were conducted in December. Seventeen infested areas of about 200 fading pines were detected, with the greater concentration still in Tyrrell County. One new spot was observed in adjacent Hyde County, and another was seen in central Dare County. A biological evaluation of a few of the affected spots showed that population vigor of the beetle had been greatly reduced. In addition to the fewer and smaller broods per attacked tree, the number of infested trees per spot was also less. The epidemic appears to have definitely subsided, and it will probably end during 1959 if the present trend continues.

PINE ENGRAVER BEETLES

Other than what may be considered as normal, losses by the pine engraver beetles, Ips spp., took place only in isolated, weakened, and attractive trees; few concentrations of attack were noted. During October and November, however, in eastern and southeastern Georgia Ips activity was reported. Infested spots up to one-half acre in size were observed; large-scale attacks did not follow. Drought conditions prevailed during the latter summer months and into the fall and might possibly have precipitated these outbreaks.

BLACK TURPENTINE BEETLE

During the first months of the year and into early spring, turpentine beetle activity was rather prevalent throughout the Southeast. Infestations on the Hofmann Forest in eastern North Carolina remained at a high level, and numerous reports were received from the mountain areas.

Attacks by the black turpentine beetle had been associated with cutting on the private lands of the Hofmann Forest for several years, each time killing many trees in the residual stand. During a survey in March, many of the residual trees in cutover areas continued to be attacked by the beetle, and it was expected that these near-epidemic conditions would continue throughout the year. A second survey in June, however, showed that turpentine beetle attacks had greatly decreased. No further reports were received concerning increased activity.

Chemical control against the turpentine beetle took place in a 50-year-old white pine plantation of the George Washington National Forest. Some attacks requiring control had occurred in 1957 in this same area; while most infestations in 1958 were in stumps and trees injured during thinning operations, control measures were applied because of the potential hazard existing and the values involved. Examinations of this stand in June and July revealed that tree mortality had been negligible and that very few active populations remained.

Examinations of the turpentine beetle control projects on the Chattahoochee National Forest in northern Georgia were made in June. Chemical spraying of stumps and infested injured trees had taken place during early spring. The June check showed that relatively few attacks were occurring on uninjured standing trees and that stump populations were not heavy. Continued treatment in logged areas was not advised unless attacks became heavy in the residual trees.

Since early summer no reports have been received of black turpentine beetle attacks in any state in the Southeast.

BALSAM WOOLLY APHID

During the fall of 1957 a fir aphid identified as the balsam woolly aphid, Chermes piceae, was found infesting Fraser firs on Mt. Mitchell, North Carolina. In the spring of 1958, thousands of dying firs were noted on about 1,500 acres of private and national forest lands. The first entomological appraisal indicated that the aphids were the sole cause of this mortality. However, since some of the typical symptoms associated with this insect were lacking, it was thought that possibly other factors were involved. Subsequent examinations by other entomologists substantiated the belief that the aphid was the primary cause of the Fraser fir mortality.

This aphid, which was introduced into the United States from Europe and first reported in 1908, is a notorious killer of true firs and has been a serious pest in northeastern Canada and United States and in the Pacific Northwest for several years. In these areas it is primarily important as a killer of commercial-value trees, whereas in the Southeast, where acreage of fir is only about 25,000 acres, it offers a threat to scenic and recreation areas and to an expanding Christmas tree industry. A fir aphid was discovered on the Shenandoah National Park, Virginia, in 1956, and was first identified as Chermes nusslini, a species similar in habits and taxonomy to the balsam woolly aphid. However, recent identifications have shown that C. piceae is the insect involved in Virginia also.

Since natural stands of fir, usually associated with red spruce in the Southeast, are isolated and most often above 5,000 feet elevation, and since the aphid is not easily dispersed by its own means, the infestations in North Carolina and Virginia have undoubtedly been artificially initiated. The initial aphid populations were most likely introduced on planting stock of fir from some other infested area in the United States some years ago.

Surveys to determine the extent of the aphid infestations in the vicinity of Mt. Mitchell were conducted. From these surveys and with the aid of aerial photographs taken by men of the Beltsville Forest Insect Laboratory, a spruce-fir type map was constructed and areas on which distinguishable mortality had occurred were delineated. Figure 2 and table 1 show the results of these surveys.

It has been estimated that about 20 to 25 percent of the fir within the areas suffering mortality have been killed and 90 percent of the remaining trees have bole infestations. However, ground checks revealed that the aphid is spread throughout the 7,000 acres of spruce-fir type, even though mortality has not occurred in all areas. Presently it is impossible to estimate with any accuracy the number of infested firs. Aphids have been observed in all locales except on ridge tops and other aspects where wind conditions are most severe.

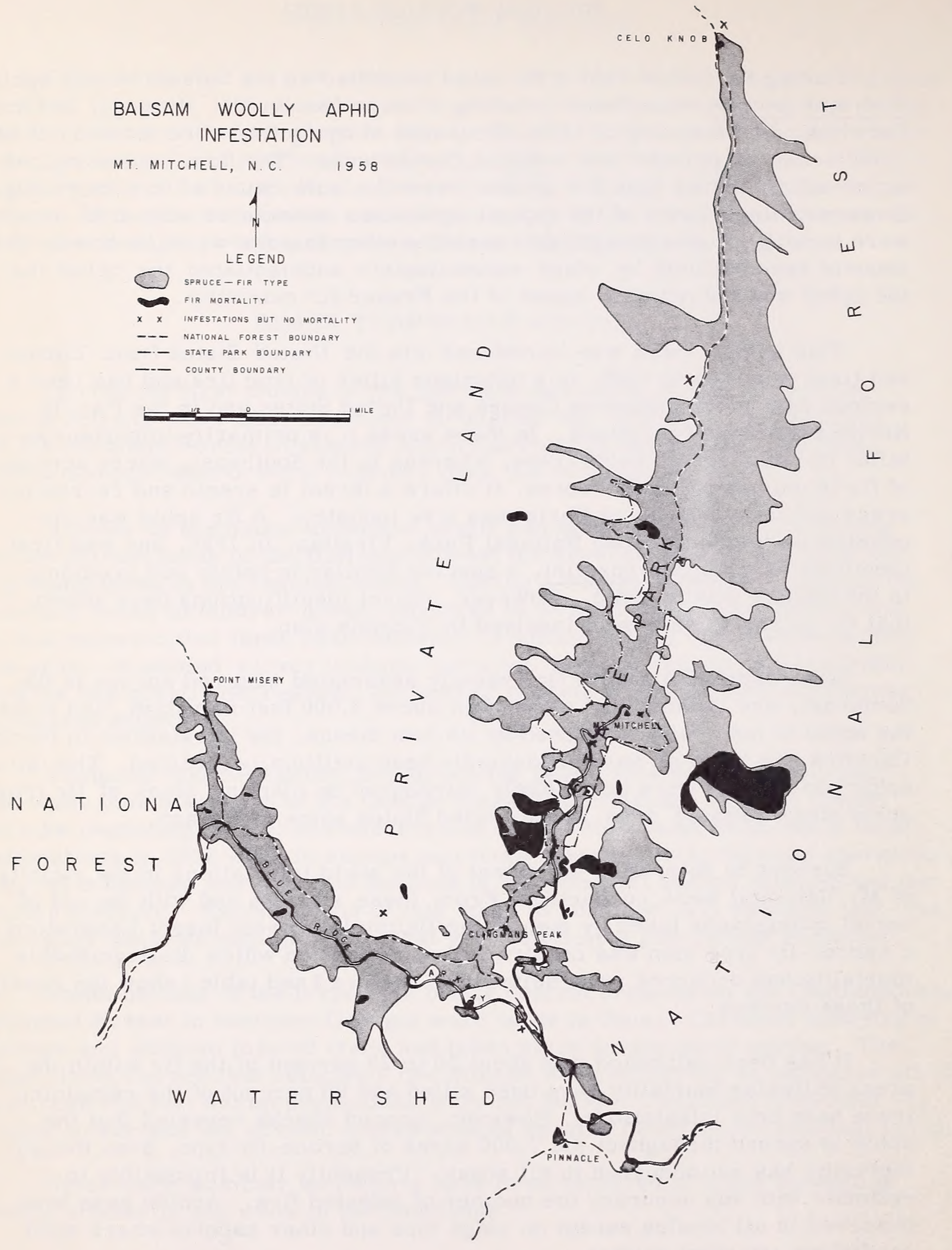

Figure 2.--Balsam fir losses on Mt. Mitchell are causing great concern because the mountain is one of North Carolina's foremost scenic attractions, visited by several hundred thousand people per year.

Table 1.--Balsam woolly aphid infestations on Mt. Mitchell, North Carolina, and adjacent lands, 1958

Type of ownership	Spruce-fir type [1]	Over 20 percent fir mortality	Firs killed
	Acres	Acres	Number
National Forest	3,740	285	5,700
Private lands	1,600	70	5,000
Mt. Mitchell State Park	860	9	180
Asheville watershed	860	5	110
Blue Ridge Parkway	[2] 465	([3])	([3])
Total	7,525	369	10,990

[1] Spruce-fir type is forest in which 50 percent or more of the stand is in spruce and/or Fraser fir.

[2] Of this total, 420 acres are also part of the Asheville watershed.

[3] Mortality not extensive enough to be easily measured.

At a special meeting of all concerned landowners, the main decisions reached concerning future action were as follows:

All available information to deal with this situation should be utilized, a pilot test of spraying insecticides to save roadside trees should be established, and research to develop sound methods of control should be conducted. To date several insecticides have been screened for controlling the aphid, plots to examine the effectiveness of cutting as a control measure have been established, and some studies to explore the biology of the insect have started.

Aerial surveys and ground examinations of all other spruce-fir stands in North Carolina and Tennessee have been completed and no infestations of the aphid have been detected. A possible suspect area on Mt. Rogers in Virginia was observed from the air, but as yet a ground check of this area to evaluate the condition has not been made.

PINE SAWFLIES

North Carolina and Virginia.--During early May an epidemic of pine sawflies, later identified as the Virginia pine sawfly, Neodiprion pratti pratti, was detected on the Piedmont Plateau of North Carolina and Virginia. It is possible that this is the same species reported in 1957 as being active in localized areas in the southeastern part of Virginia.

To determine the extent of the infestation, aerial surveys were conducted in late May, when larval feeding was completed, and prior to the development of new foliage. Defoliation occurred sporadically; within the scattered stands affected, some were free of feeding. Virginia and shortleaf pines were the only species on which feeding took place. North Carolina forests affected totaled about 50, 000 gross acres, of which 13, 000 acres were actually defoliated. The epidemic extended through 333,000 acres in Virginia, with some 117,000 acres of pine forests defoliated. The infestation area encompassed 48 counties in the two states.

Since only one generation of these sawflies occurred, and as its feeding was completed prior to 1958 foliage development, no mortality was noted. The possibility that the trees might have been weakened and become attractive to other secondary insects, such as bark beetles, was not overlooked, but no attacks of this nature were observed.

In conjunction with the forestry departments of Virginia and North Carolina and with the advice of the Northeastern Forest Experiment Station (an epidemic of these sawflies has existed in Maryland for several years), a method for sampling overwintering eggs laid in the needles was developed to help forecast 1959 defoliation. This sampling survey is to be conducted early in 1959, and it is hoped that the data obtained will permit accurate estimates of expected defoliation and also be adaptable to a better sampling scheme.

Florida.--In the fall of 1957, infestations of a sawfly on loblolly pine were observed in small, scattered groups in five counties of north-central Florida. Examination of these areas the following spring revealed that few sawfly specimens could be found, and during the early summer defoliation was not observed. By the first week of August feeding by the first generation had been completed; in September, feeding by second generation larvae was quite noticeable, with the epidemic covering about 10,000 to 30,000 acres in Taylor County. In October it was estimated that approximately 300,000 acres of pine forest in Taylor and Dixie Counties were supporting active sawfly populations. Hatching of the third generation took place in October, after which cooler weather slowed developmental time, so that a few late instar larvae were still feeding in December.

The survey work and help with some of the research findings have been handled mainly by the Florida Forest Service. Members of the Florida State Plant Board, Buckeye Cellulose Corporation, and the Southeastern Forest Experiment Station have assisted in biological observations being conducted under the leadership of Dr. L. A. Hetrick of the University of Florida.

Dr. Hetrick's collections of the adult and larval specimens of sawflies have been identified. Four species of sawflies are involved, the most numerous of which is *Neodiprion excitans*; the others are: *N. lecontei* (the red-headed pine sawfly), *N. abbottii*, and *N. compar*. It is known that the first three species have multiple generations a year, and Dr. Hetrick thinks it is likely that *N. compar* has more than one a year. In addition to these identifications, specimens of: (1) insect parasites (egg and larval), (2) insect, spider, and mammal predators, and (3) diseased larvae have been collected and identified. The actual percent mortality effected by these agents has not been made, but in some locales the combined effects of all have been extensive. Studies suggest that natural enemies may control the most severe infestations.

PINE REPRODUCTION WEEVILS

Infestations by the pine reproduction weevils were common in pine plantings in recently logged areas. The largest outbreak reported was from northeastern Florida in November, where concentrations of pales weevils, Hylobius pales, and the pitch-eating weevils, Pachylobius picivorus, were observed on 1,000 of some 12,000 acres of concentrated slash pine plantations; heavy injury took place on about 200 acres. The removal of residual seed trees and unmerchantable material during the summer probably served as the attracting force for the weevil populations. Damage to 1- and 2-year-old seedlings was heavy enough to require replanting. Older seedlings, though attacked, were large enough to withstand mortality.

PINE TIP MOTHS

Although no formal surveys were conducted in the Southeast for tip moth infestations, reports of their activity were received from all states in the territory. These insects, which affect the rate of terminal growth, are quite important to young plantations of the southern pines. Studies to investigate many of the unknown biological factors and means of control are under way at Forest Service laboratories in Macon, Georgia, and Gulfport, Mississippi, and on university and industrial experimental forests.

ELM SPANWORM

Hardwood defoliation by the elm spanworm in the mountains of Georgia, Tennessee, and North Carolina in 1958 occurred on some 570,000 acres during May and June. This was an increase of 270,000 acres over that of 1957. The forests of northern Georgia, where the elm spanworm was first found in 1954, suffered less extensive feeding than in previous years. Table 2 shows how the epidemic has increased in size every year since its inception.

The epidemic this year was again characterized by heavy feeding on the ridge tops, with heaviest attacks occurring on the hickories and the oaks. Deterioration and even mortality to the favored hosts has taken place in the areas which have supported populations of the insect for the past 5 years. In addition, studies have shown that measurable growth loss has been effected on the host trees.

Table 2.--Elm spanworm defoliation in the southern Appalachian Mountains, 1954-1958

Year	Class of defoliation			
	Light	Moderate	Heavy	Total
	Acres			
[1] 1954	--	--	--	--
1955	--	--	1,500	1,500
1956	10,000	39,500	1,500	51,000
1957	200,000	81,000	19,000	300,000
1958	425,000	114,000	31,000	570,000

[1] In 1954, defoliation was first found in local concentrations in Georgia.

Moths were observed during late June and July in large numbers in cities and towns as far as 60 miles to the east and south of the infested area. Unless some natural adverse factors are exerted against the spanworm, and to date the extent of such factors observed has appeared to be negligible, it is quite possible that defoliation may increase substantially in 1959.

In a pilot test in the spring of 1958, the aerial spraying of six 50-acre plots in north Georgia with 1 pound of DDT in 1 gallon of kerosene per acre resulted in 99-percent control.

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